

CLAIMS

What is claimed is:

1. A prosthesis adapted for implantation against a resected surface on a proximal end of a femur and inside of an intramedullary cavity of the femur comprising:
 - a femoral head component having an external bearing surface and a female friction fit portion;
 - a femoral stem component comprising:
 - a neck portion having a proximal male friction fit portion, reversibly engagable with the female friction fit portion, and a distal neck body;
 - a flange portion distal and adjacent to the neck portion, attached to the distal neck body, having an upper portion and a bottom surface;
 - a transitional body region, adjacent to the bottom surface of the flange portion and extending from the distal neck body;
 - an elongated stem portion extending distally from the transitional body region and having a longitudinal axis that is orientated at an acute angle from the bottom surface of the flange portion; and
 - a distal end tip portion adjacent and distal to the elongated stem portion;
 - wherein the transitional body region has a maximum height of less than thirteen millimeters when measured normal from the bottom surface of the flange to any part of the elongated stem portion.
2. A prosthesis as is claim 1, wherein the elongated stem portion comprises a uniform envelope with a substantially constant cross-sectional peripheral shape and size.

3. A prosthesis as in claim 1, whereby some of the forces applied to the head component during use are converted into displacement of the flanged portion and compressive forces to the calcar region of the femur through the surface on the femur.
4. A prosthesis as in claim 1, further comprising a rotation-restricting boss, extending from the bottom of the flange portion.
5. A prosthesis as in claim 2, further comprising a rotation-restricting boss, extending from the bottom of the flange portion.
6. A prosthesis as in claim 5, wherein the rotation restricting boss has an axis of protrusion with a boss axis origin near the bottom of the flange, the elongated stem also has a stem axis origin near the bottom of the flange, the boss axis origin and the stem axis origin are spaced apart by a length more than the maximum cross-section of the elongated stem portion.
7. A prosthesis as in claim 6, wherein the axis of protrusion and the longitudinal axis are substantially parallel.
8. A prosthesis as in claim 6, wherein the axis of protrusion and the longitudinal axis are not substantially parallel.
9. A prosthesis as in claim 6, wherein the axis of protrusion is normal to the bottom of the flange portion.
10. A prosthesis as in Claim 1, wherein the elongated stem portion has a distal section with multiple longitudinal flutes, the longitudinal flutes are aligned approximately parallel to the longitudinal axis.

11. A prosthesis as in Claim 1, having a distal section on the opposite end of the distal elongated stem portion; the distal section having a slot transverse to the longitudinal axis.
12. A prosthesis as in Claim 1 wherein the neck portion is aligned at an obtuse angle with respect to the bottom surface of the flange portion.
13. A prosthesis as in Claim 12 wherein the obtuse angle is between 100° and 170°.
14. A prosthesis as in Claim 1 wherein the neck portion has a first end and a second end, the first end is connected to the flange portion and extending proximally therefrom; the second end is shaped to press-fit into a head component.
15. A prosthesis as in Claim 14 wherein at least a portion of the outer surface of the head component is hemispherical.
16. A prosthesis as in claim 1 wherein the acute angle ranges from 15° to 80°.
17. A prosthesis as in claim 2 wherein the uniform envelope has a maximum cross-section area measured on a plane perpendicular to the longitudinal axis.
18. A prosthesis as in claim 1 wherein the elongated stem portion has a length of at least one hundred millimeters as measured along the length of its longitudinal axis.
19. A prosthesis as in claim 2 having a slot in the distal end of the elongated stem portion
20. A prosthesis as in claim 1 having a tapered portion within the elongated stem portion.

21. A prosthesis adapted for implantation against a resected surface on a proximal end of a femur, and inside of an intramedullary cavity of the femur, comprising:
- a femoral head component having an external bearing surface and a male friction fit portion;
 - a femoral stem component comprising:
 - a neck portion having a proximal male friction fit portion to reversibly engage with the male friction fit portion and a distal neck body;
 - a flange portion distal and adjacent to the neck portion attached to the distal neck body having an upper portion and a bottom surface;
 - a transitional body region, adjacent to the bottom surface of the flange portion and extending from the distal neck body;
 - an elongated stem portion, extending distally from the transitional body region and substantially aligned with an longitudinal axis that is at an acute angle from the bottom surface of the flange portion, the elongated stem portion having a uniform envelope with a maximum cross-section outer periphery dimension; and
 - a distal end tip portion adjacent and distal to the uniform envelope;
 - wherein the transitional body region has a maximum height, measured normal from the bottom surface of the flange to any part of the transitional body region, the height is less than the diameter of the maximum cross-section outer periphery dimension.

22. A prosthesis as in claim 21, whereby some of the forces applied to the head component during use are converted into compressive forces through the bottom surface of the flanged body.
23. A prosthesis as in claim 21, further comprising a rotation-restricting boss, extending from the bottom surface of the flange portion.
24. A prosthesis as in Claim 23, wherein the rotation restricting boss has an axis of protrusion with a boss axis origin near the bottom of the flange, the elongated stem also has a stem axis origin near the bottom of the flange, the boss axis origin and the stem axis origin are spaced apart by a length more than the maximum cross-section of the elongated stem portion.
25. A prosthesis as in claim 23, wherein the axis of protrusion and the longitudinal axis are substantially parallel.
26. A prosthesis as in claim 23, wherein the axis of protrusion and the longitudinal axis are not substantially parallel.
27. A prosthesis as in claim 23, wherein the axis of protrusion is normal to the bottom of the flange portion.
28. A prosthesis as in Claim 21, wherein the elongated stem portion has a distal section with multiple longitudinal flutes, the longitudinal flutes are aligned approximately parallel to the longitudinal axis.
29. A prosthesis as in Claim 21, having a distal section on the opposite end of the distal elongated stem portion; the distal section having a slot transverse to the longitudinal axis.

30. A prosthesis as in Claim 21 wherein the neck portion is aligned at an obtuse angle with respect to the bottom surface of the flange portion.
31. A prosthesis as in Claim 30 wherein the obtuse angle is between 100° and 170°.
32. A prosthesis as in Claim 21 wherein the neck portion has a first end and a second end, the first end is connected to the flange portion and extending proximally therefrom; the second end is shaped to press-fit into a head component.
33. A prosthesis as in Claim 32 wherein at least a portion of the outer surface of the head component is hemispherical.
34. A prosthesis as in claim 21 wherein the acute angle ranges from 15° to 80°.
35. A prosthesis as in claim 21 wherein the uniform envelope has a maximum cross-section area measured on a plane perpendicular to the longitudinal axis.
36. A prosthesis as in claim 21 herein the elongated stem portion has a length of at least one hundred millimeters as measured along the length of its longitudinal axis.
37. A prosthesis as in claim 21 further comprising a tapered portion within the elongated stem portion.

38. A method of surgically repairing a hip joint comprising;
- providing a femoral hip prosthesis comprising a femoral head component and a femoral stem component, the femoral stem component comprising a neck portion with a proximal male friction fit portion and a distal neck body, a flange portion distal and adjacent to the neck portion attached to the distal neck body having an upper portion and a bottom surface, a transitional body region, adjacent to the bottom surface of the flange portion and extending from the distal neck body, an elongated stem portion, extending distally from the transitional body region and aligned with an longitudinal axis that is aligned at an acute angle from the bottom surface of the flange portion;
- reaming an intramedullary cavity in the proximal femur with a reamer;
- resecting the bone tissue on the proximal femur to form a resected proximal femur;
- reaming a boss cavity in the proximal femur;
- inserting the elongated stem portion of the femoral hip prosthesis in the intramedullary cavity,
- placing at least part of the flange portion on the resected proximal femur; and
- inserting at least a portion of a rotation-restricting boss into the boss cavity.

39. A method of surgically repairing a hip joint comprising;

providing a femoral hip prosthesis comprising a femoral head component and a femoral stem component; the femoral stem component comprising a neck portion with a proximal male friction fit portion and a distal neck body, a flange portion distal and adjacent to the neck portion attached to the distal neck body having an upper portion and a bottom surface, a transitional body region, adjacent to the bottom surface of the flange portion and extending from the distal neck body, an elongated stem portion, extending distally from the transitional body region and aligned with an longitudinal axis that is aligned at an acute angle from the bottom surface of the flange portion;

resecting the bone tissue on the proximal femur to form a resected proximal femur;

preparing a non-eccentric, symmetric intramedullary cavity in the proximal femur;

reaming a boss cavity in the proximal femur;

inserting a portion of the elongated stem portion of the femoral hip prosthesis in the intramedullary cavity,

inserting at least a portion of a rotation-restricting boss into the boss cavity, and

placing at least part of the flange portion on the resected proximal femur.

40. A prosthesis adapted for implantation against a resected surface on a proximal end of a femur and inside of a cavity of the femur, comprising:

a femoral head component having an external bearing surface and a female friction fit portion;

a femoral stem component comprising:

a neck portion extending substantially outside the cavity of the femur and having a proximal male friction fit portion, reversibly engagable with the female friction fit portion, and a neck body extending distal and lateral to the male friction fit portion:

a flange portion medially and distally projecting from the neck body having an upper portion and a bottom surface;

an elongated stem portion extending substantially inside the cavity of the femur and extending distally from the neck body and having a longitudinal axis that is orientated at an acute angle from the bottom surface of the flange portion; and

a distal tip portion adjacent and distal to the elongated stem portion;

wherein the elongated stem portion has an outer surface that is substantially circumscribed by a surface of revolution.

41. A prosthesis adapted for implantation against a resected surface on a proximal end of a femur and inside of a cavity of the femur, comprising:

- a femoral head component having an external bearing surface and a female friction fit portion;
- a femoral stem component comprising:
 - a neck portion extending substantially outside the cavity of the femur and having a proximal male friction fit portion, reversibly engagable with the female friction fit portion, and a neck body extending distal and lateral to the male friction fit portion;
 - a flange portion medially and distally projecting from the neck body having an upper portion and a bottom surface;
 - an elongated stem portion extending substantially inside the cavity of the femur and extending distally from the neck body and having a longitudinal axis that is orientated at an acute angle from the bottom surface of the flange portion; and
 - a distal tip portion adjacent and distal to the elongated stem portion;.

wherein the elongated stem portion has an outer surface that is substantially circumscribed by a surface with a substantially uniform cross section.

42. A prosthesis adapted for implantation against a resected surface on a proximal end of a femur and inside of a cavity of the femur, comprising:

- a femoral head component having an external bearing surface and a female friction fit portion;
- a femoral stem component comprising:
 - a neck portion extending substantially outside the cavity of the femur and having a proximal male friction fit portion, reversibly engagable with the female friction fit portion, and a neck body extending distal and lateral to the male friction fit portion:
 - a flange portion medially and distally projecting from the neck body having an upper portion and a bottom surface;
 - an elongated stem portion extending substantially inside the cavity of the femur and extending distally from the neck body and having a longitudinal axis that is orientated at an acute angle from the bottom surface of the flange portion; and
 - a distal tip portion adjacent and distal to the elongated stem portion;

wherein the elongated stem portion does not vary in its maximum cross sectional width by more than ten percent.